Joint Air Mission Commanders and Time Sensitive Targets

A Monograph

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The current joint air operations command and control structure for strikes against time sensitive targets (TSTs)centralizes too many decisions which, in turn, reduces the flexibility of the air strike package and often leads to mission failure. However, it may be possible in many circumstances, through the use of modern automation and networked information systems, to decentralize decision making. Strike packages are led by air mission commanders. Decentralizing decision making to the air mission commander through the use of network centric warfare (NCW) technologies may be the means to shorten the TST kill chain. Current air mission commander training and qualification is not established in doctrine and the instructions that exist do not address the types of decisions a true joint air mission commander would face. By reviewing existing requirements for time sensitive attacks and the joint air operations procedures for planning and executing such attacks, this study observed that the air mission commander was in a position to make important tactical and operational decisions but he possessed neither the training nor the authority to do so. From this conclusion, it followed that changes are needed in joint air doctrine, air mission commander training, and air command and control systems to exploit NCW capabilities and to provide more effective attack of TSTs.

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Abstract

JOINT AIR MISSION COMMANDERS AND TIME SENSITIVE TARGETS by Major Jeffrey D. Macloud, USAF, 46 pages.

Innovations in command and control procedures for joint air operations have been unable to keep pace with changes in technology and military requirements. Current U.S. operational capabilities often fail to meet the need to task, re-task, and approve strikes against increasingly prevalent mobile, easily camouflaged targets. Networked information systems hold promise for easing the difficulties presented by time sensitive targets (TSTs). However, without improvements in command and control, technological tools may exacerbate the friction of war rather than alleviate it. The current joint air operations command and control structure for strikes against TSTs centralizes too many decisions which, in turn, reduces the flexibility of the air strike package and often leads to mission failure. However, it may be possible in many circumstances, through the use of modern automation and networked information systems, to decentralize decision making. Strike packages are led by air mission commanders. Decentralizing decision making to the air mission commander through the use of network centric warfare (NCW) technologies may be the means to shorten the TST kill chain.

Current air mission commander training and qualification is not established in doctrine and the instructions that exist do not address the types of decisions a true joint air mission commander would face. A review of the current doctrine and operational procedures for attack of TSTs revealed unrealized decision-making potential in the form of a joint air mission commander. By reviewing existing requirements for time sensitive attacks and the joint air operations procedures for planning and executing such attacks, this study observed that the air mission commander was in a position to make important tactical and operational decisions but he possessed neither the training nor the authority to do so. From this conclusion, it followed that changes are needed in joint air doctrine, air mission commander training, and air command and control systems to exploit NCW capabilities and to provide more effective attack of TSTs.

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INTRODUCTION

The nature and tactics of America’s enemies have evolved significantly in the past two decades, largely in response to recent American military success. Increasingly, U. S. military forces must battle elusive foes that employ hit and run tactics in an effort to survive U. S. technological overmatch. In addition, the pace of technological change in military equipment is accelerating. Networked information systems are becoming ubiquitous in modern American and allied militaries, providing previously unattainable rates and volumes of information flow throughout the chain of command. This technological innovation provides an excellent opportunity to use information systems to find, fix, and target this era’s more elusive adversaries. However, technological innovation alone isn’t enough. Doctrine and organizational structure, particularly at the operational level, must also provide innovative solutions to leverage technological advances.

Military command and control structures have adapted at the operational level in order to exploit information technology and to enable efficient and effective handling of time-sensitive targets. However, the operational and tactical levels of war are no longer distinct, and this is never clearer than during the attack of time sensitive targets (TSTs). Operational commanders want the flexibility to control as much or little of the attack as the tactical and political situation dictate. Likewise, tactical aviators want the capability to understand and execute within the increasingly dynamic intent and rules of engagement of operational commanders. The complex nature of most TST missions brings the competing considerations of *risk* and *reward* to the fore. How much risk is acceptable for the potential rewards of success? Each TST mission is different. Operational commanders and tactical leaders need a flexible, accountable, and reliable process for balancing risk and reward on a timeline that allows TST success. Rethinking how the JFACC utilizes air mission commanders may provide an answer.

The air mission commander operates at the center of the TST process but is often left out of the decision making. He is charged with planning mission execution but he currently does not have the authority to authorize tactical action in TST scenarios. Current doctrine holds TST execution authority at the joint force commander (JFC) level. The JFC, in turn, can delegate TST authority down to component commanders, e.g. the joint forces air component commander (JFACC), and often does. Although doctrine recommends further delegation of execution authority as far down the chain of command as possible, the JFACC hesitates to do so absent a doctrinally established joint concept of decentralized authority below the air operations center level.[1] A bolstered joint air mission commander concept can provide the JFACC with a means to delegate TST execution authority, as the situation dictates, to a trusted subordinate. Current air mission commander training and operational utilization does not now provide such an option to the JFACC. The following brief description of an actual TST mission during Operation SOUTHERN WATCH in the summer of 2000 provides an example of both the cumbersome nature of current TST doctrine and the lack of flexibility in the current air mission commander concept.

The air mission commander of a routine patrol in the southern no fly-zone in Iraq was retasked, prior to takeoff, to strike a mobile early warning radar that had been erected in violation of U.N. resolutions. The target was detected and located via satellite imagery, and identification was confirmed by Predator UAV video. The Predator remained on-scene throughout the strike providing real-time video to the CAOC. The strike aircraft experienced target acquisition difficulty due to environmental factors, but was cleared to release after ten minutes of detailed coordination with the CAOC through AWACS relay. The first crew missed the target due to identification problems. The CAOC immediately confirmed the miss via Predator video and attempted to adjust the aircraft aimpoint with radio calls relayed through AWACS. The air

[1] *Commander's Handbook for Time Sensitive Targeting*, National Defense University Institute for National Strategic Studies, Sep 02, I-5.

mission commander did not have the authority to redirect the formation quickly to reattack the target which would have conserved the formation's fuel. He was forced to reflow outside the target area and await clearance to reattack. A second attack eventually identified the target but failed to achieve a direct hit due to weapons malfunction. Further coordination required by the CAOC delayed a third attempt and the mission ran out of fuel and returned to base. The TST attack was unsuccessful.

The air mission commander leading the TST attack described above was underutilized as a tactical leader. His experience and up-to-the-moment situational awareness of the target environment was not leveraged by the CAOC to achieve mission success. For instance, an initial assessment of the actual threat situation and the obvious difficulty in target acquisition would have likely led the air mission commander to accept minor risk by performing a reconnaissance pass near the target at an altitude more conducive to target acquisition. Furthermore, an air mission commander with authority to make reattack decisions would have shortened the time between attacks and achieved target destruction prior to running low on fuel.

Instead, the air mission commander merely performed normal flight leadership duties and was forced to defer all meaningful decisions to the CAOC. The centralized execution described above might have been appropriate had the scenario presented a higher level of risk, such as a credible air defense threat, or a high level of potential reward. However, this particular TST attack experienced very little enemy resistance and promised only a minor punitive reward against an Iraqi regime in blatant disregard of the U.N. resolutions. To be fair to the CAOC and the CFACC, they could not leverage the air mission commander in this scenario because current joint doctrine does not provide a means to do so.

The joint community can provide the JFACC with on site mission control by establishing a joint air mission commander doctrine that builds the trust and expertise required to allow the JFACC to properly delegate execution authority in TST situations. The current air mission commander framework does not address this requirement in practice and it is not established at all in joint doctrine. The JFACC, therefore, lacks a doctrinally established process that might encourage decentralization of TST decision-making. Weapon systems possessing impressive information systems are now available to air mission commanders and can empower these tactical leaders to fill the doctrinal void in TST execution.

Networked information systems have changed fighting platforms so drastically in the past decade that many pundits claim the United States is experiencing a revolution in military affairs (RMA). The veracity of the claim that modern military forces are experiencing an RMA remains to be proven. But warfare has certainly evolved significantly in a very short period of time. Increasingly, battlefield networks that provide near-real-time situational awareness link American fighting systems of all services and some coalition partners. Information can now be passed simultaneously to multiple layers of the command structure, negating the cumbersome and time-consuming process of information distribution. The air mission commander, armed with networked information systems, now has situational awareness that provides an outstanding opportunity for delegation of decision-making authority. The air mission commander does not, however, enjoy a doctrinally established command and control structure. Current doctrine does not capitalize on the potential power of networked information systems because it lacks the command and control structure to do so.

Joint doctrine publications do provide guidance on joint tasking and targeting. In fact, recent joint publications address TST execution in great detail. These documents provide an important backdrop to the establishment of joint air mission commander doctrine because they contain the foundation of the organization within which the joint air mission commander must operate. Specifically, the air mission commander is inextricably tied to the joint targeting cycle (JTC), the ATO production process, and joint TST targeting tactics, techniques, and procedures (TTPs). As currently written, these documents and processes provide for an air command and control system that looks increasingly like centralized execution, even though decentralized execution is one of the primary tenets of airpower. The system and doctrine were designed to handle Cold War era fixed targets and remain relatively inflexible in TST situations.

Providing increased command and control flexibility requires some doctrinal amendment. Current doctrine is still appropriate for large-scale conventional scenarios where fixed military and infrastructure targets will likely retain priority status on the joint target list. Therefore, joint command and control doctrine should obviously not be discarded. Rather, the joint air mission commander construct should be integrated into the existing doctrine to provide the JFACC with improved options for decentralization, particularly in TST scenarios.

The air mission commander operates in a complex operational system that includes ground and airborne command and control, space-based assets, unmanned aerial vehicles, joint and coalition tactical platforms, and, of course, an enemy intent on survival. The details of the components of this system bear significance because they define the boundaries and basis for any doctrinal discussion of air command and control.

REVIEW OF CONCEPTS

TSTs

> *While we always seek to seize the initiative and make adversaries adapt to us, command requires the ability to steer airpower as the battle rhythm dictates, independent of the rigidities of an ATO cycle.* – Gen Hal Hornburg, Commander U. S. Air Force Air Combat Command[2]

Joint doctrine currently defines TSTs as: "Those targets requiring immediate response because they pose (or will soon pose) danger to friendly forces or are highly lucrative, fleeting targets of opportunity." While component commanders are free to prosecute most TSTs detected within their own area of operations (AO), attacking many of these TSTs require joint procedures

[2] General Hal Hornburg, commander, USAF Air Combat Command, *Initial Command Focus*, 14 Nov 01, accessed 15 Nov 04 online at https://wwwmil.acc.af.mil/cc_corner/focus.pdf.

because the targets straddle AO borders or the attacks require integration of joint assets.[3] Joint doctrine, therefore, provides a fairly robust description and typology of TSTs.

TSTs do not comprise a unique set of targets. Rather, they are best described (see Figure 1) as a select subset of the normal targeting definitions contained in joint doctrine. Targets are divided into two broad categories – *planned* and *immediate*. Planned targets are targets identified and nominated as part of the doctrinal targeting process. They may be *scheduled* for timed execution as part of an overall plan, or *on-call* to be executed when conditions for execution are met. *Immediate targets* are those that have been identified too late for inclusion in the doctrinal targeting process, and can be either *unplanned* or *unanticipated*. *Unplanned immediate targets* are those targets that are known to exist but have not been identified or located in sufficient time for inclusion in the normal targeting procedures. *Unanticipated immediate targets* are targets not previously identified.[4]

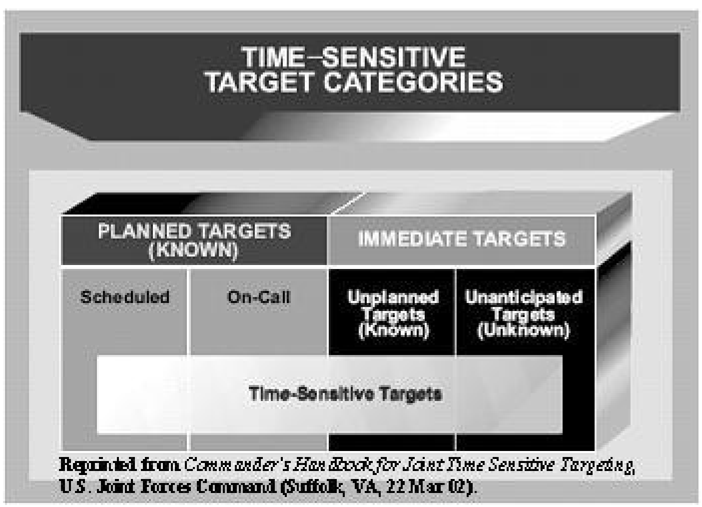

Figure 1: Time sensitive target (TST) categories.

Figure 1 illustrates the complex challenge that TSTs present at both the operational and tactical levels of war. When speaking of attacking a TST, the target may be known or unknown,

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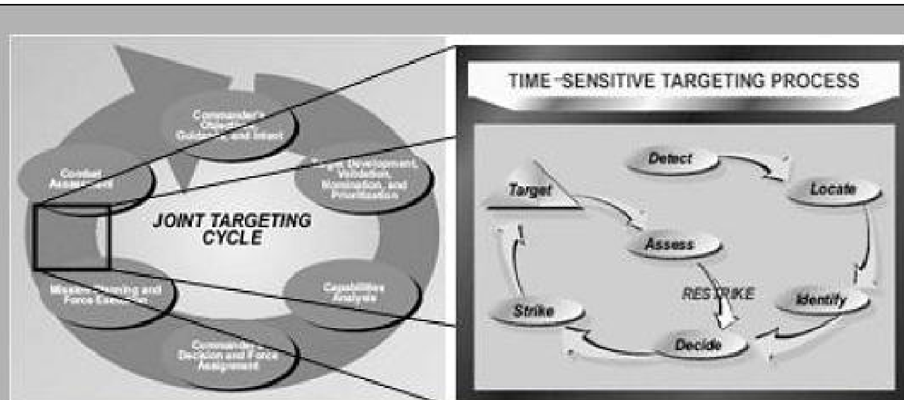
[3] TST Handbook, I-1.
[4] Ibid, I-2.

planned or immediate, scheduled or on-call. Targets like strategic leadership (*planned on-call*), mobile surface to air missiles (*planned scheduled*), insurgent ammunition storage areas (*immediate unplanned*), or unexpected insurgent leadership meetings (*immediate unanticipated*) all merit classification as TSTs. While Figure 1 is useful for describing a typology of targets, it can be misleading. The wide TST band that crosses all four subcategories of targets does not accurately represent the likelihood that one type of target might be classified as a TST. Clearly, as a percentage of each type, far fewer *planned* targets will end up being TSTs than *immediate* targets.

Execution of TSTs occurs within the larger framework of the joint targeting cycle (JTC). The placement of the TST process within the larger targeting cycle is an important concept. Figure 2 depicts the JTC on the left. Starting from the top and working clockwise, the six phases of the JTC are: guidance, target list development, capabilities analysis, force assignment, execution, and assessment. The blow-up on the right depicts the placement of the TST targeting process in between the execution and assessment phases of the JTC.

TST execution, by definition, occurs after formal mission planning, during mission execution, and prior to completion of mission assessment. It is a cycle within a cycle.



Data synthesized and reprinted from *Commander's Handbook for Joint Time Sensitive Targeting*, U.S. Joint Forces Command (Suffolk, VA, 22 Mar 02).

Figure 2: TST cycle nested inside the JTC.

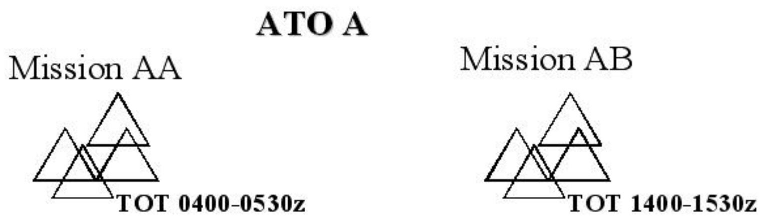
Changes within one part of the cycle have implications for the entire system. TST execution, for example, may impact priorities and tasking for the larger JTC. Conversely, changes in ATO tasking and priorities will likely have implications for TST execution. TSTs may be tasked for execution to airpower, sea power, ground forces, or even space assets. However, the JFACC is most often tasked to attack TSTs because of the range, flexibility, and responsiveness of airpower. Therefore, the TST process under the JFACC's operational supervision can often hold critical implications for the success of joint operations. The air mission commander plays an important role in the JFACC execution chain.

Air Mission Commanders

Unlike the concept of TSTs, air mission commanders have been an important element of joint strike execution since the Vietnam War, even though the air mission commander's role is not defined in joint or service doctrinal principles. The concept of air mission commanders exists solely in service specific TTP and training manuals, and seems to be an accepted means of joint strike coordination, even without established doctrinal guidance. This arrangement has worked in the past because air mission commanders traditionally led strike packages on missions against *planned, scheduled* targets as part of a master air attack plan (MAAP). Contemporary operating environments offer a far less static array of targets. Air mission commanders today find themselves planning and leading strike packages that are either tasked or sometimes retasked to strike TSTs. Current doctrine does not provide the air mission commander with a foundation to perform this volatile mission.

The air mission commander plans the mission during the targeting cycle and once airborne, administers an ATO-assigned portion of the MAAP. The MAAP cell turns the JFC and JFACC targeting and apportionment guidance into a coherent air attack plan by "packaging" target sets. Considerations like target location, priority, threat level, target type, and timing drive the decision-making. "Packaged" target sets are assigned to formations of aircraft called air missions. Air missions typically contain air superiority assets, air defense suppression assets, and strikers (bombers and attack aircraft). The MAAP is the basis for the ATO, which is generated and disseminated upon JFACC approval.

There are normally several missions per ATO, and each mission has its own alphanumeric identifier. Typically, one of the striker formations will be designated as the air mission commander. Each air mission commander is generally responsible to the JFACC for overall deconfliction of mission assets across a broad spectrum of mission factors, such as flight path deconfliction, radio frequency assignment, and air refueling procedures and priorities. In addition to the air mission commander, specific formations are typically designated as package commanders according to mission task. For instance, an offensive counter-air (OCA) flight leader will be designated as the air superiority package commander. Package commander definitions are not set in doctrine, and typically include a suppression of enemy air defense (SEAD) package commander, and a command and control package commander. The mission commander normally – but not always – doubles as the strike package commander. The package commanders work for the mission commander and are responsible for coordination inside their respective mission task areas. Figure 3 graphically presents a simple notional ATO breakout. The chart shows two separate missions with distinct time on target (TOT) blocks and identifies each mission and the package commanders. Mission AA and AB are separated by TOT in this example, but need not be. When targets are widely dispersed, geographic separation of target packages in large AOs may suffice to warrant separate mission identification. Note that both missions have assets that might be in theater, out of theater, or flying from an aircraft carrier at sea. Communication between the mission commander and the package commanders is critical, but not always easy because the mission elements may be flying long distances, through many time zones. For instance, B-2 Spirit bombers occasionally execute missions from home station in Missouri. Depending on the duration of the mission, these assets may already be airborne and enroute to the AO before the mission is tasked and ATO published, which complicates the air mission commander’s task of leading the planning effort.



Callsign	Type	Msn	Rmks
Hoss 51	F-15E/4	INT	Msn CC
Dart 11	F-16/4	INT	
Char 21	F-18D/4	INT	
Ghost 31	B-2/2	SA	
Cylon 71	F-15C/4	OCA	Pkg CC
Fazer 41	F-15C/4	OCA	
Bones 61	F-18C/4	OCA	
Slam 01	F-16/4	SEAD	Pkg CC
Pinto 81	F-16/4	SEAD	
Tron 91	EA-6B/2	EA/EP	
Darkstar	AWACS	C2	Pkg CC
Hoover	RC-135	Recon	

Callsign	Type	Msn	Rmks
Hoss 51	F-15E/4	INT	
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Fazer 41	F-15C/4	OCA	
Bones 61	F-18C/4	OCA	Pkg CC
Slam 01	F-16/4	SEAD	
Pinto 81	F-16/4	SEAD	Pkg CC
Tron 91	EA-6B/2	EA/EP	
Darkstar	AWACS	C2	Pkg CC
Hoover	RC-135	Recon	

Figure 3: Sample ATO breakout showing mission and package commander assignments.

The air mission commander’s duties and responsibilities officially begin upon publication of the ATO, although some prior coordination is often accomplished on an ad hoc basis. Mission commanders will initially develop an overall “gameplan” for the elements assigned to his mission number. His responsibilities include mission planning guidance, overall tactics selection, mission briefing preparation, taxi and takeoff details, communications plans, air refueling priorities, orbit and ingress deconfliction, target area deconfliction and timing, egress and recovery plans, and initial mission debrief of lessons learned.

For conventional operations against *planned, scheduled* targets, the air mission commander will direct the mission planning effort. Conventional missions normally include very detailed schedules and routes for all mission elements so that takeoff order, refueling requirements and priorities, and recovery procedures can be determined. Numerous mission factors drive the planning details. Mission commanders consider enemy defenses, terrain, weather, time of day, assets available, and mission priorities when determining initial planning guidance for the rest of the mission elements. Once planning commences, the air mission commander monitors progress and ensures every potential area of internal mission conflict is mitigated or avoided.

The air mission commander normally runs the mission briefing and leads his own formation of strikers to the AO. As the mission elements reach the AO, they check in with command and control agencies, which in turn report mission status to the air mission commander. Once total mission accountability is achieved and mission weather is updated, the air mission commander will consult with the JAOC to make a “go/no-go” decision, or possibly execute a previously briefed alternate weather plan if required. The air mission commander’s duties essentially end once the mission “go” decision is made. The package commanders and their flight leaders make all tactical decisions from this point. The JAOC, through direct communications or radio relay, control overall mission execution decisions. The air mission commander technically retains the ability to call off the mission in the event of overwhelming enemy resistance or unexpected weather, but rarely if ever has any other mission-specific authority.

Current TST procedures do not specifically make use of air mission commanders at all. In some cases, mission commanders may make recommendations to the JAOC about appropriate asset allocation to TST requirements. In other cases, air mission commanders may have been tasked during planning to designate holding areas and initial administrative procedures for mission elements retasked for TST operations. However, in nearly all cases, mission assets assigned to attack TSTs get specific and detailed instructions directly from the JAOC, sometimes via an AWACS radio relay. For TST purposes, the JAOC, sometimes hundreds of miles removed from the AO, assumes tactical control of the TST mission. The air mission commander’s job is essentially completed before the real fight begins. A review of mission commander selection and training will provide some insight into JAOC reluctance to delegate authority during TST attacks.

The Air Force, Navy and Marine Corps select their own senior flight leads and instructors and train them to lead the planning and execution of combat ATO missions. These mid-grade officers are responsible for accomplishing the JFACC's mission intent, mitigating risk and leading mission packages *sometimes in excess of 50 combat aircraft*. Yet, as stated before, neither joint nor service doctrine mentions the mission commander's role in joint air operations. Furthermore, the services each develop their own mission commander training programs with no guidance from joint doctrine. The air mission commander concept has worked well in the past largely because the ATO process has provided operational level details like target coordinates, time-on-target windows, and refueling coordination that help mission commanders visualize the battlespace. TST decision-making is typically beyond the current training level of most air mission commanders.

Currently, the services each utilize unit-specific air mission commander training programs that are coordinated only at an informal level. For instance, in the Air Force, the unit designs the mission commander training program in accordance with extremely general and abstract guidelines published in airframe-specific training instructions.[5] Short of informal coordination and collaboration between unit training managers, USAF mission commander training programs may vary widely based on airframe type, unit operational commitment, and leadership preferences. The USAF Weapons Instructor Course (WIC) provides one counterbalance to the possibility of disparate mission commander training. WIC is a six-month instructor course specifically designed to generate a pool of tactical experts. WIC graduate assignments are managed by regulation to ensure even distribution of these experts throughout USAF flying units. WIC graduates serve as senior instructors and have great influence over the training of USAF air mission commanders. Consequently, WIC provides the Air Force with some degree of standardization among USAF-trained air mission commanders.

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[5] Air Force Instruction (AFI) 11-2F-15E, Volume I, Aug 03, 62.

The U. S. Navy (USN) follows a training program very similar to the USAF. Flying unit commanders have great latitude in determining the qualifications and training of the aviators in their units. The Navy and Marine Corps also have training programs similar to WIC that graduate experts in tactical aviation, to include mission commander responsibilities.

Joint and coalition large force exercises, like RED FLAG have provided decades of air mission commander training and joint exposure. RED FLAG training has been invaluable to the successful use of the ATO and JFACC concepts. RED FLAG missions present an air mission commander with the challenge of safely leading 50 or more combat aircraft through a laterally tight (by aviation standards) airspace. The missions sometimes include live air to surface munitions and are often handcuffed by strict rules of engagement, all while being opposed by both ground and air defenses. RED FLAG is as challenging as it is fun.

Traditional RED FLAG missions originated from Vietnam era experience and are designed to train air mission commanders to lead combat missions against Cold War era targets and threats. The end of the Cold War has not made this kind of training obsolete. Potential adversaries with large standing militaries remain in the world. However, the current global war on terror (GWOT) promises a far more fluid combat scenario than traditionally provided by RED FLAG. Air mission commanders trained to defeat RED FLAG scenarios are not necessarily equipped with the skills necessary in the contemporary environment previously described. RED FLAG is evolving to meet this challenge. Recent RED FLAG exercises have included more contemporary training problems like TST execution and airborne re-tasking, and the RED FLAG complex now boasts its own air operations center. The training is moving in the right direction, but the doctrine still lags. Without doctrinal footing, training provided by individual units and exercises like RED FLAG runs the risk of being wasted effort or dangerously off the mark. Air mission commanders must receive training based on a joint doctrinal template that establishes trust and confidence with the JFACC.

Potential adversaries with credible air defense capabilities continue to exist, requiring continued attention to conventional combat skill sets. However, there are also less capable adversaries who, undaunted by U. S. technological superiority, have and will likely continue to present a military challenge. The success of American airpower employment over the last 13 or more years has taught these adversaries that they will die if they are located. Astute adversaries of American power have done all they can to frustrate our capability to find, fix, identify, and target them. The target set in a limited, low-scale conflict might consist of a large number of these fleeting, mobile, and often camouflaged targets. These are the TSTs described above. Their destruction involves a race against the clock. They seek to relocate before the JFACC's TST cycle can attack them. Constant target relocation and identification problems extend on-station times. Current air mission commander training is geared towards fixed target sets, clearly defined TOT blocks, and predictable strike package flow to and from target areas. Therefore, air mission commanders are not trained to make the kind of decisions required to lead long duration, highly transient missions.

Strike package deconfliction is one of the most demanding and important considerations mission commanders face during mission planning. Current air mission commander training, such as RED FLAG, simulates a rigid ATO process geared specifically toward this kind of planning. TST planning, however, does not allow such detailed deconfliction in the planning phase because the target locations, and often the target identities and types, are unknown prior to takeoff. Air mission commanders need training programs that promote flexibility in planning and on-the-spot decision-making in the execution phase of the targeting cycle.

Mobile targets can challenge the validity of decisions made early during planning about the application of rules of engagement (ROE). These changes in the relationship between target location and the ROE create a decision cycle during airborne TST execution that current air mission commanders are generally ill equipped to handle. Consequently, the JFACC may be compelled to hold TST decision-making authority at the JAOC in order to mitigate risk. Clearly, high-risk TST execution decisions should remain at the JAOC and the JFACC level. However, delegation of TST execution authority to properly trained air mission commanders may speed up the TST attack cycle to avoid execution delays, and possible mission failure when, for example, a target moves two kilometers down a desert road. In lower risk scenarios, mission commanders can quickly make ROE decisions, since they often have “eyes-on” the target areas, allowing rapid TST attack adjustments and precluding an unnecessarily long and often confusing chain of communications to and from the JAOC.

Mobile targets present other administrative problems besides ROE application. Extended “on-station” times caused by airborne TST replanning can significantly stress available air refueling assets and require quick prioritization decisions. For instance, if a TST becomes the JAOC-directed priority target for a mission, individual strike elements within that mission may have to be cancelled and directed to return to base in order to make extra air refueling capacity available for the TST attack. During high risk or high value TST execution, the JAOC and JFACC will likely, and correctly, hold decision-making authority. However, a properly trained JAMC can speed up the decision-making in these scenarios by applying on-the-scene expert knowledge of the *actual* situation on the ground and in the air. Delegation of decision-making authority about which airborne assets are required to prosecute a TST attack to the air mission commander provides a more tailored and appropriate solution to each TST tactical problem. Current training and doctrine does not provide the JAOC and JFACC with enough confidence in the air mission commander to promote such delegation. The result often is degeneration to centralized execution by the JAOC and demotion of the air mission commander to glorified briefing builder. The increasing prevalence of TST situations in contemporary operations warrants a more effective and efficient method of command and control during TST execution.

Command and control systems of the past two decades have been largely designed to provide a decision conduit between the tactical and operational levels of war. Current and future command and control systems promise a more robust information sharing capability that can empower delegation of decision-making authority down the chain of command. Pundits point to network-centric warfare (NCW) technologies as the key to the future of mission command and control. However, technological change does not alone constitute innovation. To leverage NCW concepts, doctrine and organizational changes need to accompany the technological improvements that empower the NCW model. There are two options for leveraging information technology to attack TSTs. One option is to leverage battlespace networks to empower the air operations center (JAOC) to dole out execution decisions directly to tactical platforms rapidly. This method is largely based on technological innovation and is the focus of current TST doctrine and training. Alternatively, senior leaders may choose to capitalize on the power of networked battlespace systems by combining them with decentralized decision-making. This second approach improves TST performance by transforming the air mission commander into the JFACCs decision-maker on-the-scene. Networked information systems can provide the decision tools to make this possible.

Network Centric Warfare (NCW)

Networked information systems are becoming more common in all U. S. military services and at all three levels of warfare: strategic, operational, and tactical. These systems allow digital information sharing that has the potential to expedite decision-making. Alberts, Garstka and Stein define NCW as:

> an information superiority-enabled concept of operations that generates increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization.[6]

Simply put, NCW systems link all of the knowledgeable players in the battlespace in order to turn information superiority into combat power. For example, intelligence agencies, general officers

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[6] D. S. Alberts, et. al., *Network centric warfare: Developing and leveraging information superiority*. (Washington, DC: DOD C4ISR Cooperative Research Program, 1999), 15.

and combatants in the fray might all have simultaneous access to the same new piece of information, such as the location of an enemy unit. This horizontal sharing of information, when coupled with innovative changes in doctrine and training, can empower rapid decision-making down the chain of command in order to maximize the pace and effectiveness of combat operations. The following discussion, based on the actual SOUTHERN WATCH TST mission outlined earlier, demonstrates how NCW technologies will empower rapid decision-making.

The F-15E dual-role fighter currently employed by combat ready Air Force squadrons has been upgraded to include integrated data link technology with command and control platforms. From a TST perspective, a fighter that positively locates a target can instantaneously transfer the coordinates for that target to other fighters simply by designating the target, which is required prior to release. Other aircraft in the fighter's formation simply cue their sensors to the target. Coordinate transcription errors or garbled radio calls are eliminated because the data is transferred automatically. Sensor cueing, aided by Global Positioning System integration, is incredibly accurate and consistent. Therefore, the other members of the formation can help the primary attacker confirm target identification, and the mission commander can theoretically make collateral damage and risk assessments if empowered by the JAOC to do so. Had the aircraft in the earlier example of a failed TST attack been equipped with this technology, the initial miss because the aircraft improperly identified the target may have been averted immediately by wingman intervention. Further, an empowered air mission commander could have directed immediate reattacks based on shared cueing and enhanced situational awareness.

A strong proponent of NCW, Admiral Arthur Cebrowski believes networked information systems will increase the speed of command by enabling the concept of self-synchronization.[7] Self-synchronization provided by NCW systems promises to enable decentralized air mission commander decision-making by providing real-time information throughout the battlespace. The

[7] Vice Admiral (Ret) Arthur K. Cebrowski, Director of Force Transformation, Office of Secretary of Defense, Statement Before Senate Armed Services Committee, Apr 02.

JAOC and the air mission commander can, in theory, view the same picture of any given situation simultaneously, eliminating the requirement for radio chatter and the possibility of distorted messages. Furthermore, the mission commander and associate package commanders see the same operational picture, reducing the need for extraneous and often distracting verbal communications. In short, NCW systems are excellent situational awareness enhancers and provide a properly trained air mission commander with the tools required to make important TST decisions at the point of the attack.

The downside to NCW innovations is that clear and comprehensive operating pictures across the levels of command and control offer operational, strategic, and political leadership the opportunity to interact (possibly interfere) at the tactical level. Senior leaders might elect to avail themselves of this opportunity for any of three reasons.

Senior leaders may elect to intervene tactically via NCW systems from a desire to mitigate political risk. Modern information systems (civilian and military) have fundamentally altered the psychological impact of even small tactical events upon strategic and political aims. For example, a coalition force of American and French attack aircraft mistakenly bombed a refugee convoy in April 1999 during the air war over Kosovo, killing many civilians and handing the Serbian leadership a powerful information warfare tool. Forced to fly above an altitude of 15,000 feet, the fighters were unable to discern that the convoy of vehicles, which had been passed by command and control elements as a military convoy, was in reality a group of refugees fleeing a village by tractor-drawn carts. The media impact of this event was obviously significant and colored operations for the rest of the conflict. Senior leaders understandably tightened control of all air execution after that incident.[8] The state of the art for command and control in 1999 did not provide operational and theater level leaders with the same quality of common

[8] Daniel Williams, "NATO Turns Silent on Refugee Deaths", *The Washington Post*, 17 Apr 99, accessed 20 Jan 05 online at http://pqasb.pqarchiver.com/washingtonpost/40626746.html?did=40626746&FMT=ABS&FMTS=FT&date=Apr+17%2C+1999&author=Daniel+Williams&desc=NATO+Turns+Silent+on+Refugee+Deaths%3B+Briefings+Withhold+Details%2C+Focus+on+Strikes+Against+Serbs.

operating picture they have become accustomed to today, yet the risk of political failure was more significant than the risk of missed TST opportunities. Contemporary senior leaders in similar situations will have access to high fidelity digital situation displays. Grabbing control of execution in order to mitigate strategic and political risk will be easier than ever.

Second, higher echelon commanders may decide to intervene in tactical situations to manage what they perceive as excessive risk to operational success. Digital situation displays and real-time streaming video from on-the-scene sensors provide unprecedented and probing coverage of tactical operations to anyone with the authority to “log on”. Therefore, higher echelon commanders, engrossed in the digital presentation of operations, might perceive an impending unacceptable risk to the mission and decide to direct tactical events.

Finally, senior commanders risk mistaking the relative calm of a command post or operations center and the apparent accuracy of a digital operating picture for superior situational understanding. Digital information systems depict correct and incorrect situations with equal veracity. The completeness, coherence, and credibility of the depicted information may not be equally apparent across the levels of command and control. For instance, an incorrectly placed icon on a digital screen will be detected and discarded far quicker by units on the scene than by elements removed from the action. Conversely, higher echelon observers may be less task-saturated and feel more capable of grasping the complexities of a digitally presented tactical problem than the units feeling the heat of battle. The desire to use this perceived advantage in situational understanding might encourage overreach.

The examples above may occur in isolation, but more likely would occur in some combination. Although joint doctrine and professional publications acknowledge the risks of such overreach, the political realities of networked information systems and ubiquitous media coverage may make such situations practically unavoidable. Commanders will have to continually weigh the political and operational risks they face against the disadvantages of centralized execution. However, in order to have an option other than centralized execution, the

JFACC requires a trusted agent on the scene with the training and doctrinal footing required to perform TST decision-making. A properly trained and equipped air mission commander, leveraging NCW systems, can provide the JFACC a realistic opportunity to truly decentralize execution when conditions warrant.

Decentralized Execution

Decentralized execution is a guiding principle of U. S. military doctrine. Each of the U. S. military services considers decentralized execution essential to gaining and maintaining the tactical initiative.[9] By delegating execution authority down the chain of command, leaders empower subordinates to make tactical decisions. Decentralized decision-making allows subordinates to adjust to localized circumstances without the cumbersome prerequisite of passing information back up the chain of command for approval. Proponents of decentralized execution assume a greater degree of tactical situational understanding at the lower echelons of action.

Advocates of NCW theory, however, claim that modern networked information systems may invalidate the assumption that lower echelons possess the greater situational awareness. NCW systems, these experts say, will eliminate levels in the chain of command, allowing direct control of tactical action with far greater accuracy and responsiveness than ever before. Stateside JAOCs provide an example of this thinking, with networked information systems allowing commanders to run a hot war across the globe from inside the gates of a secure American military base. Of course, such scenarios must rely on a whole new series of conditions to be successful. For instance, information posted on the network must be correct, timely, applicable, decipherable, and secure to make this kind of centralized decision making via NCW systems work. If these conditions are met, the difficulty of passing information back and forth between echelons will

[9] Army Field Manual (FM) 6-0, *Mission Command: Command and Control of Army Forces,* Aug 03, and Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine,* Nov 03.

disappear. In fact, the process will become instantaneous and self-synchronizing.[10] Although there is reason to believe that human-designed information systems are many decades away from achieving artificial intelligence that empowers autonomous complex decision-making, the progress made in the past two decades is astounding. So the question remains, how do organizations design command and control to best capitalize on the power of NCW systems? Decentralization is one answer.

U. S. military doctrine outlines the concept of decentralized execution in some detail. Guiding all of the services, joint doctrine defines decentralized execution – simply - as the "delegation of execution authority to subordinate commanders."[11] Further, joint command and control doctrine establishes decentralized execution as a paramount consideration to foster initiative, responsiveness and flexibility in the face of the uncertainties of combat situations.[12]

Basic USAF doctrine defines decentralized execution as the "delegation of execution authority to responsible and capable lower-level commanders," and contends that it is "central to the proper application of airpower.[13] And yet the USAF command and control doctrine recognizes that political involvement in low to mid-level military activities "tends to drive a higher level of centralized command," which challenges the "optimal balance in centralized control and decentralized execution."[14] The previous quotations are an important USAF doctrinal statement because it represents a conscious acknowledgment of the trend towards centralized execution when technology and a relatively slower pace of operations allow greater senior level involvement.

In contrast, the USMC's doctrine states that decentralized execution allows commanders to set the appropriate tempo of operations while better coping with the uncertainty, fluidity and

[10] Bill Owens and Ed Offley, *Lifting the Fog of War* (New York: Farrar, Straus and Giroux, 2000), 72.

[11] Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 7 Oct 04, 143.

[12] JP 3-30, *Command and Control for Joint Operations*, 5 Jun 03, I-3.

[13] AFDD 1, 28, 97.

[14] AFDD 2-8, *Command and Control*, Feb 02, 7.

disorder of combat.[15] Inspired by the heady work of "maverick" philosopher John Boyd, the USMC has indoctrinated its members in the necessity of decentralizing execution in order to operate inside the enemy's "OODA Loop." Boyd presented a decision-making cycle of observe, orient, decide, and act, often called the "OODA Loop." Although Boyd's model is far more complex than the simple OODA acronym, the premise of the work remains fairly simple when applied to air mission commanders and TST. By decentralizing execution down to the lowest level and training joint air mission commanders to make combat decisions, the JFACC would possess the ability to operate inside the enemy OODA loop by reacting decisively before the adversary can frustrate targeting. Boyd's work on combat decision-making provides support for decentralized execution.

Boyd believed that human existence and endeavors are ruled by chaos and that the harder one tries to measure the true nature of something, the more suspect the results of that measurement will be. From this guidance, the USMC developed doctrine stating that fog and friction are unalterable facts of warfare. Only initiative and innovation empowered by decentralized organizations will be able to effectively compete in these environments.[16]

The JFC and the component commanders all understand the benefits of decentralized execution. However, they also must execute in an information environment that often serves as a telescopic lens, magnifying tactical events (especially errors) to the uncomfortable level of strategic or political importance. When they perceive this type of risk, senior commanders will need the flexibility to determine the appropriate level of decentralization. The joint air mission commander concept can provide the JFACC with a ready alternative in TST situations.

TST scenarios bring all of the factors discussed above into sharp focus. Time-compressed targeting situations involving multiple levels of tactical and operational risk challenge the decision-making system of the JAOC. Networked information systems promise to

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[15] Marine Corps Doctrinal Publication (MCDP) 1-0, *Warfighting*, 1997, 78.

[16] Grant Hammond, *The Mind of War: John Boyd and American Security* (Washington DC: Smithsonian Institution Press, 2001), 118-120.

increase the effectiveness of decision-makers at all levels, but also provide many potential new pitfalls to avoid. Unnecessary centralization of execution can be a serious downside of NCW systems. To avoid centralization, the JFACC needs a reliable and realistic alternative closer to the fight with NCW capability. The air mission commander is currently underutilized and poorly trained in TST situations, but with some doctrinal amendment, promises to provide an answer to the problem of executing TSTs.

The joint air mission commander construct works by bridging the current skill gap between the operational and tactical levels of war. Joint air mission commanders who possess training and knowledge in operational art as well as tactical execution can provide the JFACC with a direct representative on-the-scene capable of true mission command. To understand operational art, the joint air mission commander will need to completely understand the JTC, the ATO cycle, and the TST targeting TTPs.

JOINT TARGETING AND TST

The evolution of the JTC was influenced largely by Cold War experiences and lessons. The process was built heavily on the shoulders of intelligence analysis. The organizations tasked to perform the needed analysis were designed largely to collect against a mirror-image, symmetric threat such as the former Soviet Union. The JTC (Figure 4) is an operational concept and was designed to be flexible and responsive, but reflects the Cold War operational timeline. TSTs have altered the nature of operational timelines in some instances by frustrating the JTC and ATO cycles.

Joint Targeting and ATO Cycles

Reprinted from *Commander's Handbook for Joint Time Sensitive Targeting*, U.S. Joint Forces Command (Suffolk, VA, 22 Mar 02).

Figure 4: Joint targeting cycle.

The JTC begins with JFC guidance, objectives, and intent. The component commanders base their own planning guidance on the JFC's guidance. Target development occurs as part of individual component operational planning, but is vetted through a joint targeting process. After matching component capabilities to target types, mission planning takes place and the JFC's targeting plan is executed. Combat assessment helps determine which of the JFC's objectives require further targeting, and the process repeats itself.

The pace of the JTC depends largely on the nature of the battle. However, the ATO cycle will in most cases be the driving factor. The ATO cycle normally take 72 hours to complete the steps from target nomination through execution.[17] Figure 5 depicts a simplified example of the joint ATO cycle. Rows A, B, and C represent ATO "days." For instance, if ATO A is 15 Jan execution, then B is 16 Jan and C is 17 Jan. The black bar running through the center of the figure represents time in 12 hour increments, so that ATO B takes 72 hours from commencement of the targeting process to the end of execution. However, in theory, targets may be added to the

[17] JP 3-30, III-19, 20.

ATO right up to the ATO's release approximately 36 hours before execution. Amendments can add targets after that time if necessary.

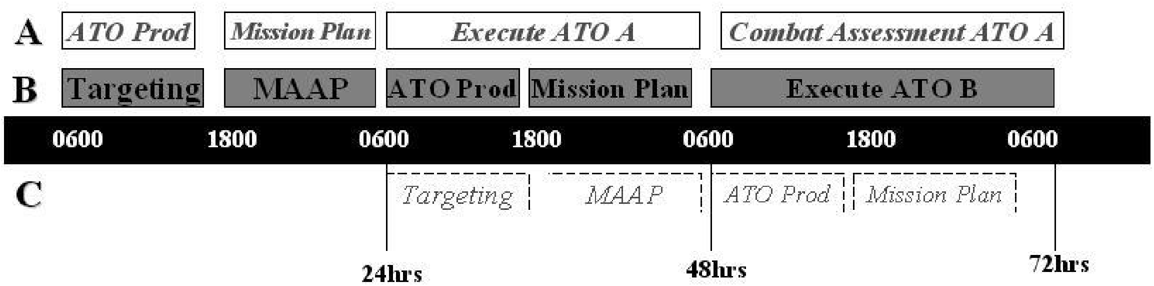

Figure 5: Notional 72 hour ATO timeline.

Notice the JAOC is actually working three ATOs during each 24-hour period. Day 2 of Figure 5 (from 24 to 48 hours) provides the best example of this. Targets which emerge in the course of battle (for instance at 0700 on Day 2 of the depicted cycle in Figure 5) may be handled in three basic ways: included in the normal targeting process (ATO C); worked during ATO production and mission planning as an ATO (B) change; or handled as a TST during execution (ATO A).

The joint integrated prioritized target list (JIPTL) is one of the key source documents for the ATO production system. Commonly pronounced "jay-pittle", the JIPTL is the main product of the joint targeting coordination board (JTCB) and represents the JFC guidance upon which the MAAP (and subsequently the ATO) is built. Each of the components (JFACC, JFMCC, JFLCC, and JFSOCC) participate in the JTCB process to nominate targets for inclusion on the JIPTL.[18] The JIPTL was designed to prioritize targets using a conventional Cold War methodology. Normally, JIPTL targets must wait at least 36 hours to be attacked. This process is appropriate for relatively static conventional targets. Industrial sites, large armored formations, airfields, and strategic command and control centers do not generally move or are not easily hidden. These targets would correspond to the scheduled targets in Figure 1. However, in limited war scenarios against non-state actors, or even failed-states where existing infrastructure must be preserved,

[18] JP 3-30, III-17.

such targets are rare. Lower intensity conflicts, like Operation ENDURING FREEDOM in Afghanistan, provide highly mobile, easily camouflaged targets. Referencing Figure 1, most targets in low intensity conflicts will be *on-call* or *immediate*. Any scheduled targets tasked by the ATO are likely to be either mobile or politically sensitive, and many of them might be treated as TSTs.

TST Cycle

Figure 6 depicts a nominal TST event and the JP 3-60 steps required to execute. For orientation purposes, ATO A is in execution, ATO B is in production, and ATO C is in targeting. TST execution normally occurs with the execution of the current ATO. In the provided example, the attack would occur during ATO A.[19]

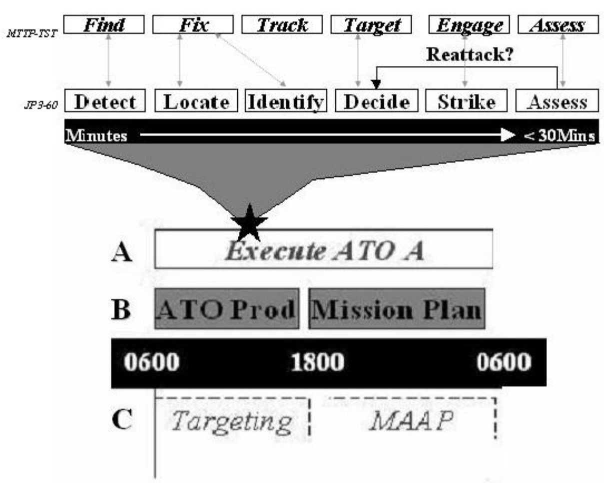

Figure 6: TST execution cycle in relationship to a typical ATO day.

Assuming a worst-case scenario with an *unanticipated target*, (Figure 1) the TST chain of events begins with detection, which may occur in myriad ways. For instance, a formation in flight might send a potentially lucrative target back to the JAOC via radio communications. A satellite image might discover a previously unknown and undetected chemical weapons facility in

[19] *Multi-Service TTP for Time Sensitive Targeting* (*MTTP-TST*) recommends a slightly different set of execution steps: Find, Fix, Track, Target, Engage, Assess. These steps are included above the JP 3-60 steps for clarification.

the process of being dissembled. Unmanned aerial vehicles (UAV), electronic reconnaissance, battle damage assessment and human intelligence are other methods of detection. Some of these detection methods, such as highly classified satellite imagery, exist outside of the immediate visibility of the airborne joint air mission commander, even in an NCW-enabled battlespace. Consequently, targets detected by such methods will likely require JAOC and JFACC coordination, regardless of risk or reward considerations. However, some targets detected by elements already in flight, such as enemy mobile early warning radars, might be easily within the joint air mission commander’s ability to complete the TST targeting cycle without cumbersome communications procedures with the JAOC or JFACC.

Once a likely target is detected, it must be located with some precision. In some cases, such as detection by satellite imagery or battlefield intelligence, detection and location may occur concurrently. For example, the F-16CJ Wild Weasel utilizes a sophisticated electronic collection system to detect, locate and identify enemy radar systems. Therefore, the F-16CJ pilots typically detect and locate enemy radars concurrently using the triangulation subroutines resident in the aircraft systems. In other instances, such as when the target is detected by signals or human intelligence, locating the target may take significant time and energy. Using the same F-16CJ example, the aircraft system’s accuracy depends on environmental factors and is sometimes insufficient to allow direct attack using coordinate-only systems like the Joint Direct Attack Munition (JDAM). Similarly, the target may be heavily camouflaged and situated in challenging terrain. In these situations, precise target location may require a significant effort on the part of ground intelligence personnel as well as tactical and command and control platforms over the battlespace.

The target identification process typically occurs after the target is positively located and, like the location task, can either be very simple or very complex. Positive target identification (PID) procedures are normally outlined in theater ROE. PID can be fairly straightforward. For instance, in certain situations, when no friendly forces are present aircraft are cleared to attack.

On the opposite extreme of the spectrum, PID can be a complex process that requires confirmation that no friendly forces are present, positive identification of an enemy force, and clear demonstration of hostile intent by the enemy force. Most PID scenarios fall between these two examples.

The decision to strike a TST depends on numerous factors and is the most critical link in the TST execution chain. Among the many factors considered are identity and location of the decision maker, quality of the information and analysis, level of the threat forces and the mission, assets available and acceptable risk to the operators, time available for successful execution, and value of the target. Attack decisions, similar to PID, can span a spectrum from simple to complex. When the decisions trend more towards the simple side of this spectrum, the joint air mission commander can provide the JFACC with a powerful means of expediting the attack to improve the probability of success.

Strike timing and complexity depend on other factors. The most significant factors are crew experience, platform capabilities, available time, weapons, fuel, target makeup, and collateral damage potential. This is the second-most critical link in the TST chain. The quality, timing, and accuracy of the decision making process in the JAOC play a large role in the success or failure of the strike. The following example from a September 2002 TST attack during Operation NORTHERN WATCH over northern Iraq illustrates how the cumbersome coordination process between the shooters and the JAOC can all but preclude mission success.

Satellite imagery detected and located a mobile early warning radar inside the northern no-fly zone in violation of U.N. resolutions. A TST mission commenced under the leadership of the air mission commander and the radar was located and identified. However, the Iraqis had learned to stay mobile over the ten years of no-fly zone enforcement. The crew moved the radar, which had been mounted on a flatbed trailer, several kilometers up and down a rural road every ten minutes.   The TST attack was postponed every time the radar began moving, and the TST cycle was restarted every time the radar stopped in order for the JAOC to ensure target ID had been maintained and collateral damage would not be a factor. Eventually, the mission aircraft aborted the TST attack because of fuel and airspace considerations. A trained and doctrinally vetted joint air mission commander, already on-the-scene and with eyes on the target, could have avoided mission failure by confirming target identification and assessing collateral damage problems quickly, foiling the Iraqi relocation attempts. Instead, the JAOC did not have adequate trust in the existing air mission commander concept to delegate identification and execution decisions. The result was centralization and mission failure in this case.

TSTs are not all created equal. TST attacks that arise from *planned scheduled* and *planned on-call* targets can benefit from some level of detailed planning, including imagery, weaponeering, and target studies. For these TSTs, detection and location are often the toughest tasks. Once the targets are positively located, the decision and strike phases have a greater chance of success. Conversely, *immediate unplanned* or *unanticipated* TSTs present a true challenge throughout the entire execution chain because of their emergent nature. These strikes typically have no imagery support, are hastily identified and located, and challenge target acquisition and strike administration. To make matters worse, *immediate* TSTs, by definition, tend to require the quickest reaction time. Efficient command and control of the TST cycle is crucial to shortening the timeline and increasing chances for successful target destruction.

TST Command and Control for the JFACC

Senior U. S. military and political leaders consider TSTs to be special sensitive targets requiring abnormally tight command and control. The Air Land Sea Application Center's recently released publication, *Multi-Service Tactics, Techniques, and Procedures for TST* (Apr 04), offers the following insight:

> In Operation IRAQI FREEDOM (OIF), the term "TST" was used to refer strictly to a special class of targets that were identified and prioritized by the President, the Secretary of Defense (SECDEF), and the JFC. These identified target types

> were of such importance to the execution of the campaign that they were struck immediately with any asset available.[20]

The asserted TST definition from the quotation above is too narrow to be useful in contemporary operations. Political leaders and theater commanders will surely retain control of execution against politically sensitive targets that have strategic policy considerations. However, there are many targets outlined in joint doctrine and publications that meet TST criteria but may not merit the direct attention of national leaders or theater commanders. Grouping all of these targets into a label that engenders notions of tightly controlled execution procedures hampers the overall effectiveness of contemporary TST operations.

Centrally executed TSTs require tedious and complex decision cycles that – even with modern information systems – consume valuable time. Additionally, data and information is often distorted or confused through errors in transmission. Consider coordinate errors. Accurately derived coordinates can be subtly distorted in transmission sufficient to spuriously move a TST location too close to a population center and cause delay with collateral damage estimation in the JAOC. Since the TST Cell at the JAOC can't see what the shooters over the target area see, they have no way of detecting the error. A matter of minutes is all a cagey mobile target needs to invalidate the last TST decision and force a new one. All of this unnecessary delay can be avoided with a qualified decision-maker on the scene. Air mission commanders already possess the hardware, and in some cases the training, to make rudimentary airborne collateral damage determinations. However, current mission commanders do not enjoy the trust and confidence of the JAOC.

A doctrinal joint air mission commander construct must fit into the JAOC command and control structure. The current command and control structure for attacking TSTs in the JAOC is graphically represented in Figure 7. A brief explanation of the JAOC organization is required to explain how the JFACC's TST tasking flows.

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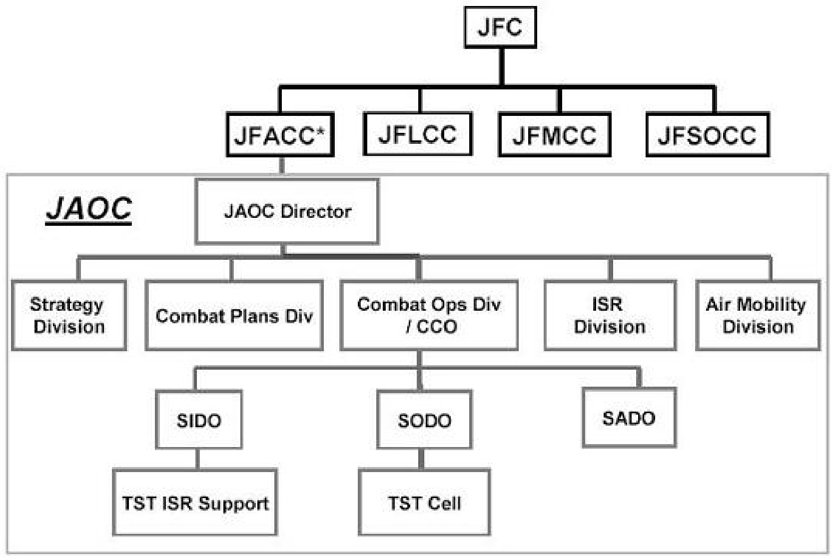
[20] FM 3-60.1, *Multi-Service Tactics, Techniques, and Procedures for TST*, Air Land Sea Application Center, Apr 04, I-1.



*In most cases, the COMAFFOR will also be the JFACC
Reprinted from *AFTTP(I) 3-2.3: TST*, Air Land Sea Application Center (Langley AFB, VA, Apr 04), p. II-8.

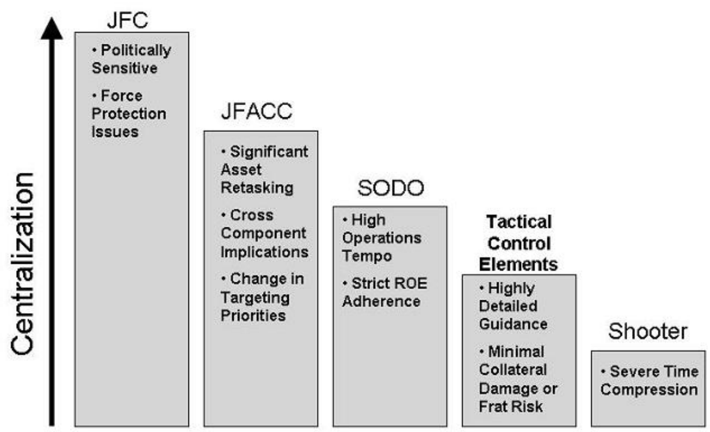
Figure 7: Joint Air Operations Center (JAOC) organization chart.

The JAOC director has five doctrinally established divisions under his direction. The following discussion is a sketch of some of their responsibilities. The Strategy Division (SD) is tasked with long range planning in accordance with JFC intent and JFACC objectives. The joint air operations plan (JAOP) is the SD's primary product, and provides overarching guidance for planning and execution. The Combat Plans Division (CPD) is the JOAC's focal point for operational art. The CPD creates the JIPTL, MAAP, and ultimately the ATO in accordance with the JAOP and other JFACC directives. The Combat Operations Division (COD), under the leadership of the chief of combat operations (CCO), executes the current ATO. Therefore, most, if not all, TST execution will take place inside COD control. The Intelligence, Surveillance, and Reconnaissance (ISR) Division directs the operations of ISR assets in support of the JAOP and the JFC's guidance. Finally, the Mobility Division, under the control of the Director of Mobility

Forces (DIRMOBFOR), plans and executes theater-level air mobility in support of the JAOP and other JFACC directives. [21]

Regardless of the method of detection, the Senior Offensive Duty Officer (SODO) is the focal point for TST execution on the JAOC's operations floor. Current USAF and joint doctrine dictates that the SODO will orchestrate the elements of the TST execution chain in conjunction with the Senior Intelligence Duty Officer (SIDO) and the Senior Air Defense Officer (SADO).[22] Although joint doctrine recommends decentralization of TST authority to the lowest feasible level, there are currently no doctrine, procedures, or training programs to help achieve this.

Joint TTPs outline five levels of command and control for TST execution (Figure 8).



Data from *AFTTP(I) 3-2.3: Multi Service Tactics, Techniques, and Procedures for Time Sensitive Targets*, Air Land Sea Application Center (Langley AFB, VA, Apr 04), p. III-3.

Figure 8: Levels of decentralization during TST execution.

A decision to decentralize control of a TST mission could place authority in any of these five levels of decentralization. In effect, these individuals and organizations are the employment options. A decision to place authority in any of them will be based on targeting considerations such as political and strategic importance, force protection, asset availability, targeting priorities, ease of identification, collateral damage or fratricide risk, and time available for execution. Recent operations reveal that most TSTs are prosecuted at the JFACC or SODO levels. In fact,

[21] AFI 13-1AOC, Volume 3, *Operational Procedures –Aerospace Operations Center*, Jul 02, 15-69.

[22] Ibid., 44.

nearly all TST tactics development and training is accomplished with JFACC and SODO execution processes in mind.

TST decision-making will remain a complicated matter. Decentralization during TST situations is directly related to acceptable risk, potential reward, and mutual trust. Figure 9 is an example of a TST decision matrix and highlights the challenging nature of this execution

Priority	TST Target Type	Desired Effect	Approval Authority	Additional Restrictions[1]	Acceptable Risk Level	Other Requirements or Notes
JFC-1	Critical weapon system A	Prevent launch	On-scene flight leader	--	HI[2]	Strike immediately with any asset. Package recommended, but will go without if required.
JFC-2	Personnel or groups meeting X criteria	Isolate, capture or kill	JFC or above	Higher level notification required prior to striking	HI	Notify JFC immediately & maintain sensor track. Package recommended (threat dependent).
JFC-3	Critical weapon system B	Prevent movement or use	JFC		MED	Hazard analysis required. Package required.
JFC-4	Critical weapon system C	Neutralize for campaign duration	TST Cell Chief	--	LOW	Suppression of enemy air defenses (SEAD) required
JFACC-5	Specific key ground force /equipment movement	Destroy	JFACC	--	LOW	Convoy of military vehicles approaching Phase Line Green
JFACC-6	Important weapon system D	Neutralize for campaign duration	TST Cell Chief	--	LOW	SEAD required

[1] LOAC, ROE & CD guidance applies to all targets.
[2] JFC will accept increased risk of fratricide and CD.

Reprinted from *AFTTP(I) 3-2.3: Multi Service Tactics, Techniques, and Procedures for Time Sensitive Targets*, **Air Land Sea Application Center (Langley AFB, VA, Apr 04), p. III-6.**

Figure 9: TST decision matrix.

environment. Although the depicted matrix outlines only six TST decision categories, clearly many more categories are possible. In fact, considering there are generically five levels of approval authority (Figure 8) and three levels of risk (low, medium, and hi from Figure 9), there could notionally be 15 levels of approval authority in relation to these two variables alone. The possibility of 15 TST approval levels is clearly untenable in a complex execution environment. Effective decentralization of TST authority requires a simpler method.

Current TST doctrine and TTPs have evolved based on a review of lessons learned in past conflicts combined with the constraints of existing command and control structures. The structure is traditional, in that it is hierarchical, and *geared towards improving centralized* *execution* by speeding the information flow between the JAOC and the shooter. This trend promises to delay for decades any hope of a significant evolution in TST command and control. Centralizing decision-making authority in an age of distributed information systems is wasteful and overly conservative. It is time to take the first steps in decentralized real-time decision-making by harnessing the power of NCW systems with a steady eye focused on the future of warfare – not the past.

Insidious Centralization

Joint and service doctrines seem to appreciate the advantages of *auftragstaktik* – decentralized decision-making inside highly trained and cohesive units. Yet, the trend towards extremely complex rules of engagement and overly detailed operations orders may negate a great deal of the decentralization the doctrine claims. Since DESERT STORM, operational ROE have grown in volume and complexity. Most theaters provide a set of standing ROE that remains relatively static. Quarterly special instructions (SPINS) add specific details to the general guidelines in the standing ROE. Further editions of SPINS, sometimes monthly, weekly, and daily, add even more complexity. The trend towards voluminous and complex ROE was likely caused by the increasing frequency of low intensity or limited warfare operations such as a decade of NORTHERN and SOUTHERN WATCH, ALLIED FORCE in Kosovo, ENDURING FREEDOM in Afghanistan, and current counter-insurgency operations in Iraq. Recent operations in Iraq and the GWOT predict a continuing need for complex ROE and senior leader oversight. With limited warfare come limited objectives and increased media and political pressure. So, while the U. S. military continues to rapidly modernize, the restrictions placed on the military during limited conflict work to negate the efficacy of this modernization. Doctrine and organizations have not kept pace with technological change.

U. S. military organizations have become more complex and unwieldy in an effort to mitigate risk and control new technologies. The natural bureaucratic tendency of the JAOC, when armed with NCW systems and faced with an increase in TST requirements, has been to create a new hierarchical layer inside the operations center. A staff section is probably appropriate to address strategically and politically sensitive TST considerations. However, adding layers of supervision is an industrial age solution to an information age problem. The trend towards increased and more public accountability through the media causes organizations to centralize for protection in an era where information systems reward efficiency to those who *decentralize*.

The future of decentralized execution appears to be in jeopardy partly because the true value of NCW systems seems to be misunderstood at nearly all levels of command. The U. S. military has become enamored with technological innovation. The price for rampant technological upgrading is a constant state of doctrinal and organizational "catch-up". Moore's Law deserves part of the blame for this situation. Gordon E. Moore – co-founder of Intel, Corp. – predicted in 1965 that the capacity and capability of computers would double every 18 months.[23] So far, Moore's Law has been remarkably accurate. The capability of information systems, therefore, **quadruples** during a typical three-year military assignment. Most systems are now driven largely by software packages, which can be rapidly upgraded or reorganized. Modern aircraft cockpits now feature more menu selections than switches. The few switches that exist are largely controlled by software applications. Therefore, a single software change can significantly alter the functionality and mission capabilities of a piece of military equipment literally overnight. At the same time, our doctrine and TTP libraries become increasingly burdened with more and thicker tomes. The apparent accuracy of Moore's Law demands that the trend towards complex and often rigid doctrine reverse itself. To harness and leverage NCW systems, military organizations need more, not less, flexibility at lower echelons. An air mission commander who has the trust and confidence of the JFACC to handle a clearly defined subset of TST situations will leverage NCW systems to achieve efficiencies unattainable in the current system.

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[23] Gordon E. Moore, "Cramming more components onto integrated circuits", *Electronics* 38, no. 8 (April 19, 1965) accessed 19 Dec 04 at http://www.intel.com/research/silicon/moorespaper.pdf.

The future effectiveness of TST operations utilizing NCW systems lays – in part - in a command and control network focused on decentralized decisions made by highly trained and doctrinally vetted joint air mission commanders. This doctrinal innovation is already more than a decade late.

DOCTRINAL INNOVATION

Superficially, the inclusion of a joint air mission commander (JAMC) in joint doctrine should be simple because air mission commanders have existed as a TTP for decades. Practically, however, air mission commanders have been anything but "commanders". The responsibilities and associated authority given to current air mission commanders resembles "coordination" more than "command." Therefore, the establishment of air mission commanders as true decision-makers in the combat arena is a significant doctrinal change and cannot be accomplished without a shift in organizational and training priorities.

Adjusting Existing Joint Command and Control

The inclusion of a JAMC in joint command and control doctrine does not require significant reorganization. Neither the JAOC nor existing command and control relationships need to be reorganized to add the JAMC to joint air doctrine. The move towards a JAMC does, however, require changes to the command and control architecture to emphasize the critical tactical control (TACON) link that exists between the JAOC and the air mission commander during operations. That link provides the means with which to delegate to the JAMC the authority to make tactical decisions. Assigning decision authority to the JAMC is key to improving TST execution. One of the first steps toward the goal of a doctrinally established JAMC is to provide a useful definition.

JP 1-02, *Department of Defense Dictionary of Military and Associated Terms*, provides common reference language and concepts for the joint community. The following example may provide a good starting point as a JAMC definition.

> Joint Air Mission Commander (JAMC) – airman delegated by the joint forces air component commander (JFACC) via the air tasking order (ATO) to exercise command and control of assigned mission assets in order to execute an air mission against a set of preplanned or emergent targets in support of the theater objectives of the joint forces commander (JFC). Level of delegated execution authority is governed by rules of engagement (ROE) and special instructions (SPINS).

JP 1-02 should also contain a definition for joint package commanders (JPC) to delineate the TACON relationship between the JAMC and the JPC once airborne and in contact with AWACS.

Current service-specific air mission commander qualifications and training requirements must be standardized and bolstered to transition to the proposed JAMC construct. Three basic but crucial changes are needed. First, the JAMC must be an officer trained and competent to make operational level decisions. Current air mission commander prerequisites are insufficient and will need to be increased so that only the most senior and qualified instructors and supervisors in individual units achieve JAMC qualification. Second, a JAMC must have direct access to a common operating picture via NCW-type technology during operations. Currently fielded systems such as Link-16 data link provide such capability. Third, a JAMC must receive standardized training set forth, in detail, by joint directives.

The command relationship between the current air mission commander and the JAOC is not defined. Figure 10 provides a suggested organization chart defining the relationship between the JFACC and the JAMC. JP 3-30, *Command and Control for Joint Air Operations*, might be the correct target publication for this chart. Notice that, while the JFACC has always had OPCON of the air assets apportioned to him, there is clear delineation of the direct OPCON relationship between the JFACC and the JAMC once the JAMC has established airborne contact with AWACS.

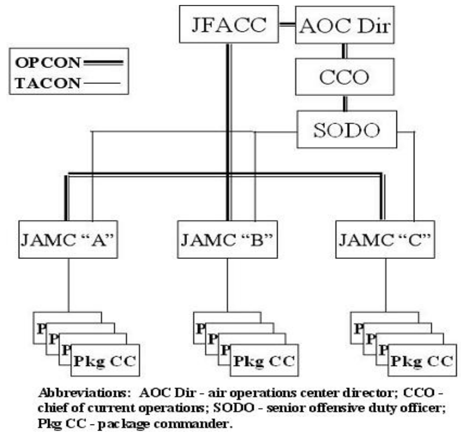

Figure 10: Joint Air Mission Commander (JAMC) command and control relationships.

In addition, the JFACC will typically delegate tactical control of the airborne missions to the SODO. Therefore, a clear chain of command exists between the JFACC and the JAMC so that the mission may be accomplished in a decentralized manner.

For most conventional ATO missions, the change from the current mission commander concept to the JAMC will have no significance. The tasking documents provided by the JAOC (ATO, ACO, ROE, SPINS) provide detailed guidance for mission accomplishment. Mission planning in accordance with that guidance has always been the mission commander's prerogative pending JAOC approval. However, contingency operations like TST or mission asset fallout offer far more opportunities for airborne leadership via a JAMC construct. Within the constraints set forth by the JAOC's tasking documents, the JAMC will have authority to assess mission risk and JFACC's intent in order to tailor the mission while airborne to meet the stated objectives. The advent of NCW technologies like data links, satellite communications, and cockpit video combined with on-the-scene situational understanding gives the JAMC unique decision-making opportunities. Currently, authority is held solely in the JAOC and is rarely delegated to airborne assets. The resulting lack of flexibility and "eyes-on" judgment decreases efficiency and may result in unnecessary mission cancellations.

The level of decision-making authority proposed for the JAMC clearly has operational level implications. The JAMC construct is a bridge between the tactical and operational levels. Therefore, there may be specific missions in which the JAMC should not be physically located in a tactical aircraft. For instance, long duration missions involving waves of aircraft cycling through a permissive battlespace to operate in kill boxes might necessitate a JAMC located in a long-duration aircraft like AWACS or the joint surveillance, targeting and reconnaissance (JSTARS) platform. In these cases, perhaps the JAMC might be a tactical aviator serving in a crew position onboard the AWACS or JSTARS. Perhaps the JAMC might be a specially qualified mission controller normally assigned to these platforms. If neither of these options fits the scenario, the SODO or a representative in the JAOC might assume the JAMC responsibilities. Placing the JAMC outside of the tactical mission area of operations, for instance in AWACS, removes the advantage of expert eyes on-the-scene, but provides the added advantage of continuity and expertise over long duration missions where the complexity of the tactical problem may prevent the JAMC from being able to successfully aviate and lead the mission at the same time.

Physical location aside, the individual tasking for the JAMC has to be given serious consideration by the MAAP and ATO teams. Under the current construct, a highly qualified flight leader of one of the ATO formations normally performs air mission commander duties. Therefore, under the current concept, air mission commanders perform mission administrative tasks while also leading their own formations as part of the overall mission objectives, including attacking their own assigned targets. Under the new construct, the JAMC would have significantly greater responsibilities for mission success in most cases and may not be able to fulfill additional missions (interdiction or strategic attack, for example). Specifically, in the case of TST, the JAMC would probably attack targets only on a “as required” basis.

While the JAMC construct has distinct advantages for conventional ATO missions, the primary advantages of the proposed doctrinal change exist in TST operations. As discussed earlier, the JAMC provides the JFACC with the flexibility to delegate significant authority down the chain of command in order to negate the cumbersome approval requirements in the existing TST process. Along with a doctrinal foundation and comprehensive formal training, clearly stated delegation ROE are absolutely crucial to JAMC success in the TST environment. Neither the JFACC nor the JAMC should ever wonder where the TST decision-making authority lies. The entire JAMC concept rests on the foundation of trust and confidence. The JAMC must understand that increased authority means increased accountability. The proposed JAMC qualification is a true combat leadership position and requires a change in mindset from existing air mission commander training.

As a combat leader, the JAMC will be nested within the command and control architecture as an employment option available to the JFACC during TST scenarios. Commanders must assess each TST situation individually, balancing risk required against possible rewards. Against this balance, commanders determine the appropriate level of delegated decision-making authority based on the trust and confidence they have in their subordinates. Figure 11 is a graphic representation of the relationship between risk, reward, and trust in a

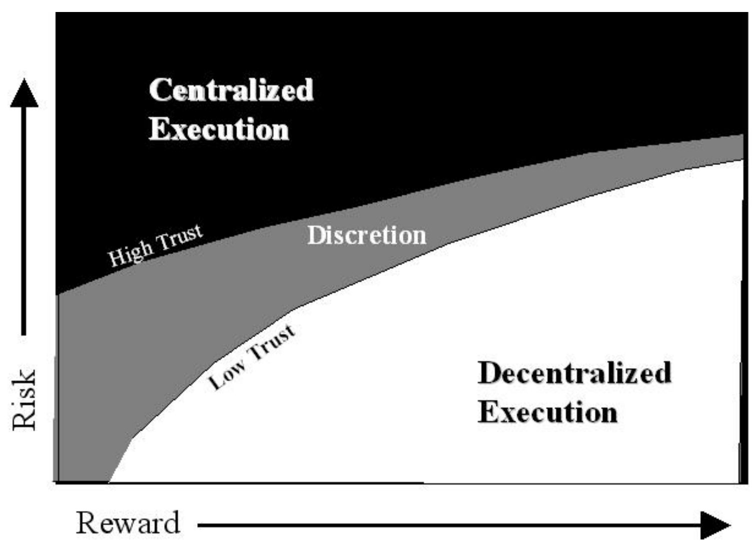

Figure 11: Relationship between risk, reward, and trust with regard to delegation of authority.

generic situation. The vertical axis represents increasing risk and the horizontal axis represents increasing reward for successful execution. The white area denotes a notional region where decentralized execution via delegated execution authority is likely based on the balance of risk and reward. The black area denotes the opposite situation where centralized execution is more likely. The grey area represents an area of discretion where commanders must weigh the trust and confidence they have in subordinates in order to make a decentralization decision. For the JAMC to be useful to the JFACC, joint doctrine and training are necessary to develop high trust and enable a more decentralized mode of TST execution.

In general, increased risk to mission, force protection, or policy requires greater attention from higher echelons, eventually resulting in centralized execution. However, at manageable levels of risk, increasing rewards from mission success may offset the centralizing effect of risk and encourage commanders to delegate. Trust and confidence are the chief determinants between centralized and decentralized execution aside from extreme risk or reward. High levels of trust and confidence, especially when risk is manageable, allow commanders to delegate more willingly when the pressure for success is mounting. As both risk and reward levels increase, commanders are less inclined to delegate authority and almost always choose to centrally control execution.

Applied to TST scenarios, then, Figure 12 makes some general predictions about where zones of delegation might be visualized in relation to risk and reward. The five depicted zones roughly approximate the levels of TST decentralization shown in Figure 8.

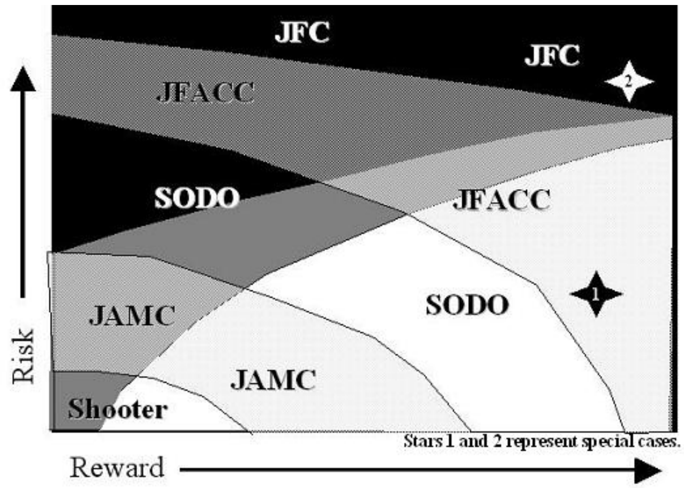

Figure 12: TST delegation zones with relation to risk, reward, and trust.

Building off of the previous illustration, Figure 12 clearly shows how centralization of decision-making increases as both risk and reward increase. When risk and reward are high, the JFC will likely hold TST execution authority. As the values of the risk and reward variables reduce toward the lower left corner of Figure 12, delegation authority progresses from the JFC to the JFACC to the SODO to the JAMC, and finally in limited cases to the shooter. Overall, the combination of risk and reward roughly equate to political and strategic sensitivity. A TST requirement that bears political or strategic implications will remain outside the reasonable delegation level of the JAMC. However, TST missions with minimal direct political or strategic implications present excellent opportunities to leverage information technology by allowing decentralized execution through the JAMC.

Note that the shooter and JAMC represent decentralized execution only (white or grey area), while the JFC represents centralized execution only (black area). Conversely, the SODO and JFACC are depicted as both decentralized and centralized execution agents, depending on the levels of risk and reward. The SODO and JFACC fight at the operational level of war and therefore provide a critical link between the highly centralized strategic and highly decentralized tactical levels of war.

Points 1 and 2 on the illustration represent special cases. For instance, at Point 1, the JFC might uncharacteristically maintain centralized execution to compensate for unusually high media attention to an event. On the other hand, the JFC might risk decentralization as far down as the JAMC at Point 2 in a situation that has been very closely planned, is remarkably fluid, and in his judgment has a much higher chance for success if decisions are made on-the-scene. In other words, personalities matter, and every situation has its own unique characteristics.

TST flexibility is the most important benefit of the JAMC concept and this also can be discerned from Figure 12. By simply removing the JAMC "belt" and replacing it with an expanded SODO "belt", it is obvious that the JFACC has far fewer options for delegating decision-making authority in the current mode of operations. The JFACC cannot trust the shooters to have sufficient knowledge of operational details to make sound decisions in the heat of battle. Shooters are generally trained to a very high tactical standard, but possess little operational knowledge beyond the published JAOC products. Without the proper doctrinally established training, the JAMC will not be able to breach the required level of trust to help improve TST flexibility and efficiency.

CONCLUSION

Technological innovation, unpredicted world events, and an emergent unconventional threat have changed much about how the U. S. military currently fights. Networked information systems are pervasive in command and control as well as combat equipment. These systems have improved information flow between the levels of command and control to the point where information saturation is not just possible, but often unavoidable. Commanders will have to decide for themselves whether centralization or decentralization is appropriate in each situation. Organizations and doctrine must evolve to leverage NCW technologies to allow commanders to decentralize decision-making when feasible.

The fall of the former Soviet Union has left the U. S. military with highly developed joint command and control doctrine for air operations that does not address the emergent unconventional threat. Mobile and easily camouflaged targets, often situated intentionally in urban areas rife with collateral damage risks, provide technologically deficient adversaries with the chance to frustrate U. S. and allied targeting in order to survive. The technology to locate, fix, and identify these TSTs exists. The doctrinal innovation to leverage these technologies, however, has lagged severely and the JAOC and JFACC remain handcuffed by industrial age command and control structures in an information age world.

Information technologies like NCW systems are best utilized in organizations filled with highly trained professionals at lower echelons who are empowered to make decisions. The current air mission commander construct does not meet the requirements of the contemporary environment. The proposed JAMC construct provides a doctrinal template for a decision-maker conversant in both the operational and tactical levels of war. Highly trained JAMCs will bridge the gap between the tactical and operational levels and provide maximum flexibility to the JFACC, especially during TST scenarios. For the JAMC construct to work, however, joint doctrine must be amended to include the concept of a JAMC and outline the command and control relationships between the JAMC, the JAOC, and the JFACC.

A properly situated and employed JAMC may be physically located in an attack aircraft, or in a surveillance and reconnaissance platform, or in the JAOC. The requirement for this kind of professional flexibility and knowledge drives a higher standard of experience and training than currently exists in the air mission commander TTP. The JAMC must be comfortable leading from the air or the chair, and must have the trust and confidence of the JFACC in order to operate effectively. Doctrinally established prerequisites and training will help establish that trust.

The reality of the contemporary operating environment begs for a more flexible range of execution options for any given situation. Risk and possible reward levels can change in intensity and direction at a moment’s notice based on media or political attention, or the actions of a savvy adversary. Commanders must possess the flexibility to issue and rescind decision authority down the chain of command in a manner that ensures clarity and engenders confidence. The requirement for increased flexibility does not, however, call for a complete restructuring of doctrine and training programs. Significant conventional threats exist that warrant an ever-vigilant eye on high intensity combat training and technologies. However, this vigilance cannot come at the cost of modernization or attention to existing combat needs.

The JFACC currently has an unsatisfactory set of options for targeting difficult TSTs that have a moderate risk and reward relationship. Unwieldy industrial age command structures cause undue delays and complications in a staff process that does not leverage the true power of NCW systems. The proposed JAMC construct offers the JFACC an opportunity to employ a highly trained expert at the tip of his spear when delegation of decision-making authority is appropriate.

RECOMMENDATIONS

The joint staff should delegate point of contact (POC) responsibilities for development of a JAMC concept of operations. Candidates for JAMC POC include Joint Forces Command or the USAF Air Combat Command. The JAMC POC should serve as the focal point for all joint development of doctrine and training programs, as well as the development of tactics, techniques, and procedures for JAMC operations.

The JAMC POC should host an exploratory joint and multi-national conference to examine the feasibility, acceptability, and suitability of a JAMC concept of air operations. This conference can also serve as a starting point for standardizing requirements and prerequisites acceptable to all parties involved.

The JAMC POC should develop and submit for publication changes to applicable joint doctrine, such as JP 1-02 and JP 3-30, that include the JAMC construct in the command and control relationships for joint air operations.

The JAMC POC should develop and publish a brief concept of JFC and JFACC decision delegation priorities for normal and TST operations.

The JAMC POC should develop standard set of joint operational procedures and training guidelines for JAMCs. These standards and guidelines should remain general in nature to allow for service and platform-specific requirements, yet provide enough detail so as to achieve a credible degree of standardization.

The JAMC POC should develop and publish a standardized core JAMC training program to include identification and training of initial instructor cadre as well as identification and tasking of supporting training units and exercises.

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